ivis: dimensionality reduction in very large datasets using Siamese Networks

Benjamin Szubert[1] and Ignat Drozdov[1]

1 Bering Limited

Summary

`ivis` is a dimensionality reduction technique that implements a Siamese Neural Network architecture trained using a novel triplet loss function. Results on simulated and real datasets demonstrate that `ivis` preserves global data structures in a low-dimensional space and adds new data points to existing embeddings using a parametric mapping function.

`ivis` is easily integrated into standard machine learning pipelines through a scikit-learn compatible API and scales well to out-of-memory datasets. Both supervised and unsupervised dimensionality reduction modes are supported.

Further information on the algorithm and its application to single cell datasets can be found in (Szubert, 2019). Implementation of the `ivis` algorithm is available on GitHub.

Acknowledgements

References

Szubert, J., B. Cole. (2019). Structure-preserving visualisation of high dimensional single-cell datasets. *Scientific Reports*, *9*, 2045–2322. doi:10.1038/s41598-019-45301-0